INDIAN NOTES AND MONOGRAPHS

A SERIES OF PUBLICATIONS RELATING TO THE AMERICAN ABORIGINES

SANDALS AND OTHER FABRICS FROM KENTUCKY CAVES

BY

WILLIAM C. ORCHARD

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NEW YORK
MUSEUM OF THE AMERICAN INDIAN
HEYE FOUNDATION
1920

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THIS series of INDIAN NOTES AND MONOGRAPHS is devoted primarily to the publication of the results of studies by members of the staff of the Museum of the American Indian, Heye Foundation, and is uniform with HISPANIC NOTES AND MONOGRAPHS, published by the Hispanic Society of America, with which organization this Museum is in cordial coöperation.

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SANDALS AND OTHER FABRICS FROM KENTUCKY CAVES

By William C. Orchard

IN 1894 the late Col. Bennett H. Young, of Louisville, Kentucky, an enthusiast in local archeology, undertook a careful investigation of some of the famous caves of that locality. His efforts were rewarded by the discovery of many remarkable artifacts of undoubted antiquity, as well as other evidences indicating aboriginal occupancy of at least some of the caves. Colonel Young has published a valuable monograph[1] illustrating and describing many of the specimens found during his work in the caves, as well as other valuable material collected in various parts of the state and in adjacent territory, illustrating the life of the prehistoric inhabitants. Many of the specimens obtained by

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Colonel Young have been added to the collections of the Museum of the American Indian, Heye Foundation, among which are some textile fabrics, which rarely occur archeologically in the East.

Owing to the favorable atmospheric conditions, and the careful manner in which the fabrics were removed from the caves, a quantity of these artifacts have been so well preserved that it has been possible to study the methods employed in weaving some of them. The greater number of specimens in the Museum collection were found in Salts cave in Edmonson county, of which Colonel Young writes:

"The Salts cave, the most prolific in prehistoric relics, and rivaling even Mammoth cave in the size and grandeur of its avenues and chambers, was known nearly one hundred years ago, and though often visited has never been thoroughly explored, and little has been written of its remarkable evidences of prehistoric life. Among the most interesting discoveries were a number of neatly braided slippers or sandals, and fragments of textile art.

"Several materials seem to have been used in the manufacture of these. Some were made of the fiber of the cattail, or *Typha*, a plant which grows abundantly in the ponds in the

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southern part of the state. Others were woven of the inner bark of trees, probably the pawpaw and linn. Still others were made of what appears to be the fiber of the wild hemp, and yet others from a species of grass which grew in great abundance on the Barrens of Kentucky."

Among the artifacts discovered in the caves, nothing of European origin was recovered. Many pieces of cut wood were found, all bearing positive evidence of having been worked with primitive tools. Numerous excavations were made in the caves by the early occupants, apparently with sharp-pointed sticks, specimens of which were recovered. Stone implements and pottery were scarce in the interior of the cave, but many flint flakes, pestles, axes, knives, and arrowpoints were found about and in its entrance. A quantity of raw material for weaving was found scattered about the floors of the cave, some of it tied in neat bundles in readiness for use. Strings of fine twisted fiber, and larger cords of braided material, sometimes of six or eight strands, were numerous, but no large twisted cord or rope seems to have been discovered.

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Of special interest are the sandals and other fabrics. Although in a good state of preservation, the materials from which these objects were made are so brittle and matted that unwrapping or untwisting the cords or weavings is impossible, and therefore a few minor details may be lacking in the following description of the technique employed in the manufacture of the textiles.

The sandals show variation in technique according to the materials employed. Those made of coarse, fibrous material, such as that which appears to be from the cattail (*Typha*), or possibly of husks or stalks of corn, are manufactured in the well-known checker weave. The workmanship in this case is rather crude, neither technique nor material lending itself to the production of a shapely sandal. The footwear made from finer material, however, shows skill in the art of weaving.

Fig. 1 illustrates a close-twined weave composed of warp- and weft-strands of slightly twisted material, which may be either wild hemp or fine grass; both warp and weft, however, seem to be of the same

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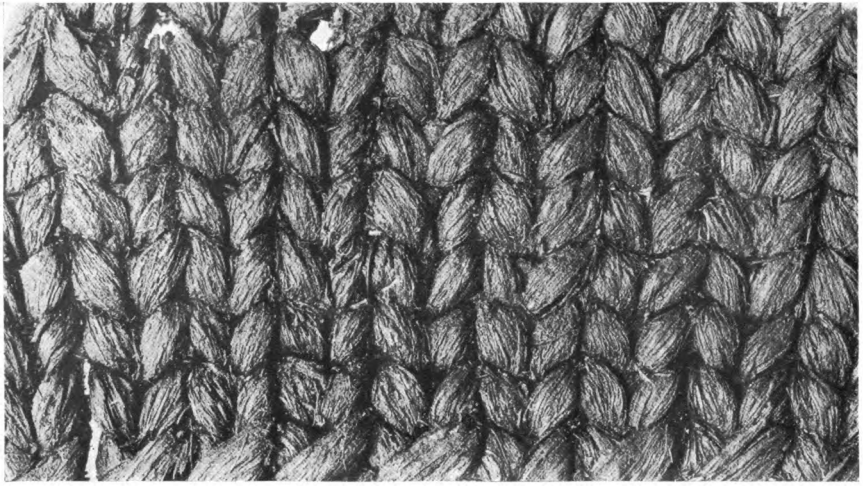

ENLARGED DETAIL OF THE CHEVRON TWINED WEAVE

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material. The weft is composed of two strands (*a*, *b*), of which the latter (*b*) passes under the first warp and over the second, while the former (*a*) crosses over the first

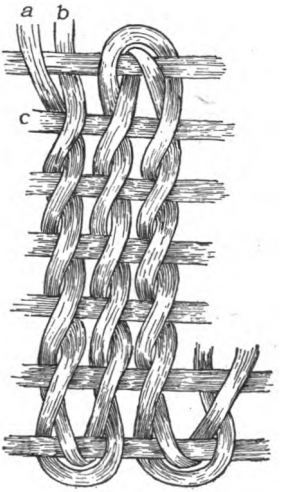

FIG. 1.—Close twined weave.

and under the second. This process is continued throughout the weave. Meanwhile the two weft-strands cross each other at the

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intersection of the warp, as shown at *c*. The drawing shows the weft-strands which are above the warp, all leaning in one direction. This is the same technique as that used in twined basketry.

Fig. 2 illustrates a different method of crossing the weft over the warp, for in this case one row points to the left, while the next one leans toward the right, the rows alternating. This change in the method of crossing the weft-strands has brought about an entirely different appearance in the finished surface of the weave, as compared with that shown in fig. 1. The result is a pattern suggesting a chevron design that seems to have had the preference, if we may judge by the number of specimens in the Museum's collection showing this technique. The drawings are made to show the weaving elements widely separated, in order that one may readily follow the crossings and turns, as well as the way of changing the direction of the weft-strands when making the turn at the edges of the weave. A comparison of the two weaves is shown in pl. I, II. The specimens, however, are all

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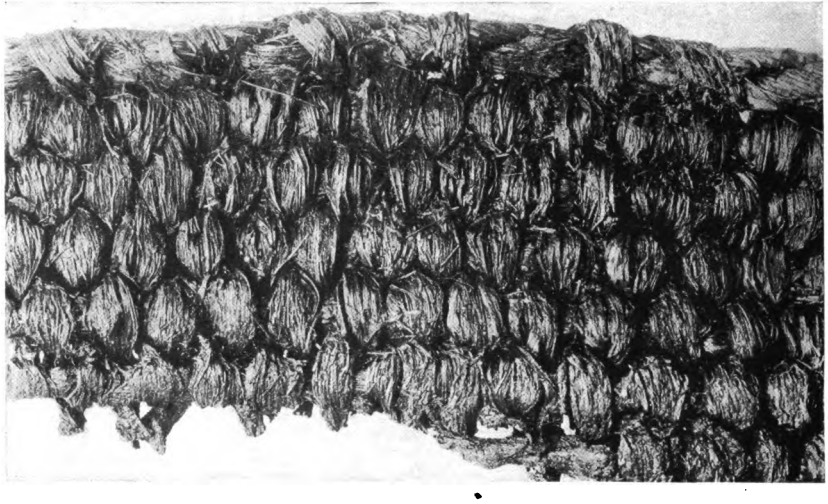

ENLARGED DETAIL OF PLAIN TWINED WEAVE

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woven closely, so that the warp-strands are entirely concealed, except for the space of about an inch in width at the back of the heel, but not reaching below the tread.

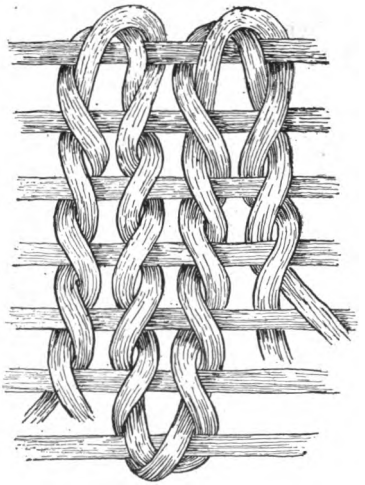

FIG. 2.—Twined weave showing chevron pattern.

The general appearance of a finished sandal would suggest that the weave was made in a rectangular piece before being shaped,

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rather than that it was formed as the weaving progressed.

One feature in favor of this belief is a point at the base of the heel, evidently effected by turning up the edges of the weave to make the sides of the sandal. A sharp bend or fold in a line of the weave would have had a tendency to cause a crowding of the fiber at that point, and this may account for the slight projection at the base of the heel. On the other hand, if the sandal had been shaped during the operation of weaving, the projection referred to would not have been likely to occur; and, further, there would be no apparent reason for the existence of the uncovered warp-strands at the back of the heel.

Another feature is the formation of the toe-end of a sandal, where the end of the weave is again folded in the middle and the edges brought together, forming a seam from the point of the toe to the instep. The sharp projection is not so pronounced here as in the fold at the heel-end of the weave. However, as there are only used, and in some cases much worn, specimens for ex-

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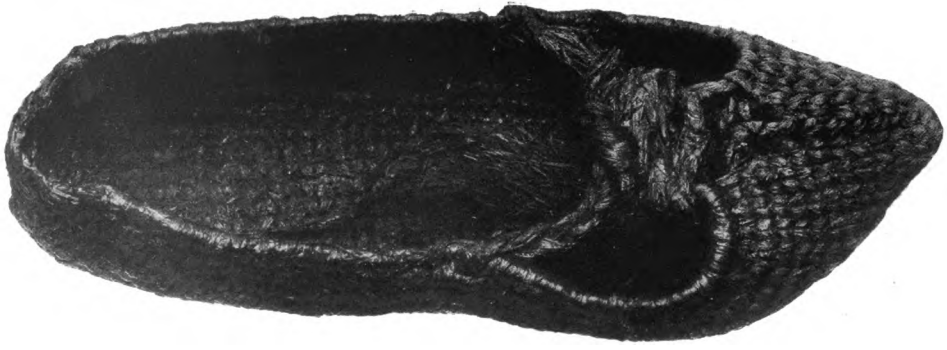

SANDAL SHAPED TO A FOOT

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amination, these peculiarities are not so prominent as they would be in a new piece of work. The following suggestions as to the method of manufacture may also furnish a reason for the uncovered warp at the back of the heel.

The warp-strands were apparently laid lengthwise of the foot and of sufficient length to extend up one side and down the opposite side of the foot, making a turn at the heel. The number of warp elements were determined by the size of the object to be made. There are twenty-two strands in the sandal illustrated in pl. III.

The weave was commenced near the looped warp and carried along to the length required, when the edges were turned up to make the sides of the sandal. This operation would have left the looped warp-strands out of line with the curvature of the heel. To overcome such defect the warp-elements above the tread could have been drawn through the weave, much like a draw-string, toward the toe of the sandal, until the slack was taken up sufficiently to give shape to the heel.

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None of the specimens examined show that the ends of the weave were brought together to make a seam at the heel, which accounts for the presence of those uncovered strands at that part of the sandal. At the completion of the desired length of weave, the corners were turned over and the edges brought together, where the ends of the warp-strands were braided, making a seam from the point of the toe to the instep. The upper warp-elements were evidently drawn tight to make the sides of the sandal fit snugly to the foot. A finishing edge around the opening has been made by coil-stitching a strand of the same material as that used in making the sandal. The ends of this finishing edge were turned back over the instep and looped into the upper edge of the sandal, just back of the instep, forming a lacing, in all probability to keep the sandal firmly in position while being worn. In some instances a sandal was made small enough to conform to the shape of the foot, as shown in pl. II, which represents a graceful, comfortable form which could hardly be improved in modern

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SANDAL WITH STUFFED PROJECTIONS ON BOTH SIDES OF THE TOES

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shoe-making. There is no doubt that the soft material used is responsible, in a measure, for this delicate shape.

Pl. IV illustrates another shape, in which the protuberance on each side of the toe has been effected by stuffing loose fiber in those parts, probably for the purpose of taking up the excess in the width or to satisfy a desire for a peculiar style in footwear. This last shape, however, predominates, at least so far as the specimens in the Museum indicate.

Owing to the soft, flexible nature of the material used in this weaving, it would be practically impossible to perform the operation without the aid of a loom of some sort to keep the warp taut; therefore a conjectural loom is illustrated in fig. 3, which represents a single-beam contrivance with weighted warp-strands. This simple form is suggested because the twined weaving may be easily produced on such a loom without the aid of various weaving tools; all the operations may be carried to completion with the fingers alone.

The important step at the commencement

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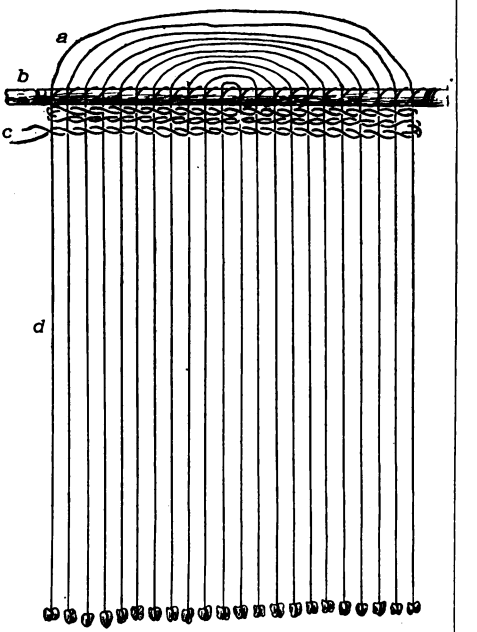

FIG. 3.—Conjectural beam loom with weighted warp-strands. (*a*, Looped ends of warp-strands above the beam; *b*, Beam to which the warp-strands are secured by lacing; *c*, Twined weft elements; *d*, Weighted warp-strands below the beam.)

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ENLARGED DETAIL OF HEAVY WOVEN BLANKET

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of a piece of weaving is to secure the warp-strands in parallel position, and to hold them taut. Supposing such a loom to have been used, those strands must necessarily have been fastened to the beam, which could be done by a process of lacing around the beam and over the warp-elements. The illustration, however, is presented for the purpose of showing the unique disposal of the warp-elements at the beam-end, in the manufacture of the sandal.

Other specimens of woven fabrics consist of two complete bags and numerous fragments, some of which may be remains of clothing or blankets. One piece especially (pl. v) suggests a blanket; it is of closely-woven, twined technique. The warp and weft are each made of six- or eight-ply twisted fiber, differing in that respect from the weaving elements employed in sandal making. The weave is close, entirely concealing the warp. This specimen, when new, was probably a quarter of an inch thick.

Pl. vi illustrates a pouch about 7½ in. deep by 9½ in. wide. The technique is an

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open twined weave. The warp is continuous—not severed at the top, but looped as shown in fig. 4. The twining is commenced along the bottom of the bag and continued

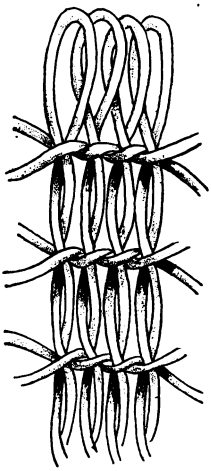

FIG. 4.—Open twined weave.

spirally to the top; the lines are about half an inch apart. The warp-strands are wrapped in pairs by the twining weft, and are twisted at each intersection of the cross-

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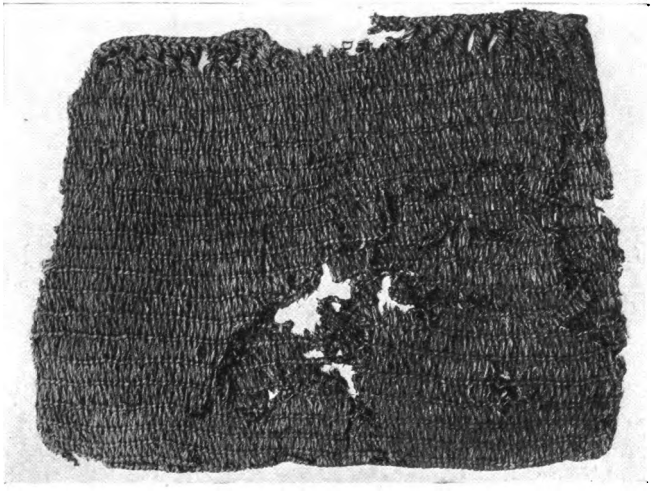

BAG OF OPEN TWINED WEAVE

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ing element. A finishing edge around the top of the bag is made of a six-strand braid, one strand of which is made to pass through groups of three of the looped warp-elements, which were twisted together before the strand was passed through. The twining and braiding fiber is of darker color than that used for the warp, although apparently of the same material, which was probably dyed for the purpose of ornamentation.

The other bag mentioned is of much smaller proportions, measuring only 2 in. wide by 2½ in. deep. Its technique is identical with that of the larger one, but the braided edge has been omitted. Bags of the same weave are not at all uncommon among the Woodland Indians of today. A number of years ago a large earthenware salt-pan in fragmentary condition, now in this Museum, was found in a mound on the banks of Cumberland river, opposite Nashville, Tenn. The under-side of this vessel shows the imprint of the open, twined weave, showing evidently that the soft clay had been built up on a number of pieces of

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cloth of that variety. The interesting feature is the variation in the sizes of the weave shown in the imprint. The lines of twining range from an eighth of an inch to seven-eighths of an inch apart, with the warp-strands correspondingly fine or coarse.

NOTE

1. YOUNG, Bennett H., The Prehistoric Men of Kentucky, Louisville, 1910.

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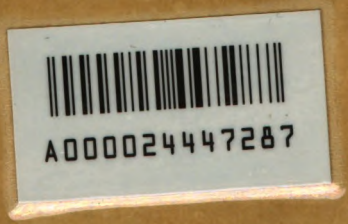
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